

What is claim d is:

1. An antisense compound 8 to 80 nucleobases in length targeted to a nucleic acid molecule encoding CD40, wherein said compound is at least 70% complementary to said nucleic acid molecule encoding CD40, and wherein said compound inhibits the expression of CD40 mRNA by at least 10%.
2. The antisense compound of claim 1 comprising 12 to 50 nucleobases in length.
3. The antisense compound of claim 2 comprising 15 to 30 nucleobases in length.
4. The antisense compound of claim 1 comprising an oligonucleotide.
5. The antisense compound of claim 4 comprising a DNA oligonucleotide.
6. The antisense compound of claim 4 comprising an RNA oligonucleotide.
7. The antisense compound of claim 4 comprising a chimeric oligonucleotide.
8. The antisense compound of claim 4 wherein at least a portion of said compound hybridizes with RNA to form an oligonucleotide-RNA duplex.
9. The antisense compound of claim 1 having at least 80% complementarity with said nucleic acid molecule encoding CD40.
10. The antisense compound of claim 1 having at least 90% complementarity with said nucleic acid molecule encoding CD40.
11. The antisense compound of claim 1 having at least 95% complementarity with said nucleic acid molecule encoding CD40.
12. The antisense compound of claim 1 having at least

99% complementarity with said nucleic acid molecule encoding CD40.

13. The antisense compound of claim 1 having at least one modified internucleoside linkage, sugar moiety, or nucleobase.

14. The antisense compound of claim 1 having at least one 2'-O-methoxyethyl sugar moiety.

15. The antisense compound of claim 1 having at least one phosphorothioate internucleoside linkage.

16. The antisense compound of claim 1 wherein at least one cytosine is a 5-methylcytosine.

17. A method of inhibiting the expression of CD40 in a cell or tissue comprising contacting said cell or tissue with the antisense compound of claim 1 so that expression of CD40 is inhibited.

18. The method of claim 17 wherein said cells are B-cells or macrophages.

19. A method of screening for a modulator of CD40, the method comprising the steps of:

contacting a preferred target segment of a nucleic acid molecule encoding CD40 with one or more candidate modulators of CD40, and

identifying one or more modulators of CD40 expression which modulate the expression of CD40.

20. The method of claim 19 wherein the modulator of CD40 expression comprises an oligonucleotide, an antisense oligonucleotide, a DNA oligonucleotide, an RNA oligonucleotide, an RNA oligonucleotide having at least a portion of said RNA oligonucleotide capable of hybridizing with RNA to form an oligonucleotide-RNA duplex, or a chimeric oligonucleotide.

21. A diagnostic method for identifying a disease state

comprising identifying the presence of CD40 in a sample using at least one of the primers comprising SEQ ID NOs 86 or 87, or the probe comprising SEQ ID NO: 88.

22. A kit or assay device comprising the antisense compound of claim 1.

23. A method of treating an animal having a disease or condition associated with CD40 comprising administering to said animal a therapeutically or prophylactically effective amount of the antisense compound of claim 1 so that expression of CD40 is inhibited.

24. The method of claim 23 wherein the disease or condition is an immune-associated disorder, an inflammatory condition or a hyperproliferative condition.

25. The method of claim 24 wherein the immune-associated disorder is graft-versus-host disease, allograft rejection or an autoimmune disease or condition.

26. The method of claim 24 wherein the inflammatory condition is asthma, rheumatoid arthritis, allograft rejection, inflammatory bowel disease or psoriasis.

27. The method of claim 24 wherein the hyperproliferative condition is atherosclerosis, cancer or a tumor.

28. The antisense compound of claim 1, wherein said antisense compound comprises at least an 8-nucleobase portion of SEQ ID NOs 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 20, 23, 25, 26, 27, 31, 32, 33, 35, 37, 40, 41, 43, 46, 47, 49, 52, 53, 54, 57, 58, 59, 60, 64, 65, 71, 73, 74, 77, 81 or 82.

29. The antisense compound of claim 28, wherein said antisense compound has a sequence selected from the group consisting of SEQ ID NOs 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 20, 23, 25, 26, 27, 31, 32, 33, 35, 37, 40, 41, 43, 46, 47, 49, 52, 53, 54, 57, 58, 59, 60, 64, 65, 71, 73, 74, 77, 81 and 82.

30. The antisense compound of claim 1, wherein said antisense compound comprises at least an 8-nucleobase portion of SEQ ID NO 116, 117, 118, 119, 120, 123, 124, 125, 127, 128, 130, 131, 134, 138, 139, 142, 143, 144, 145, 146, 147, 153, 154, 155, 156, 157, 158, 159 or 160.

31. The antisense compound of claim 30, wherein said antisense compound has a sequence selected from the group consisting of SEQ ID NOs 116, 117, 118, 119, 120, 123, 124, 125, 127, 128, 130, 131, 134, 138, 139, 142, 143, 144, 145, 146, 147, 153, 154, 155, 156, 157, 158, 159 and 160.

32. The antisense compound of claim 1, wherein said antisense compound comprises an antisense nucleic acid molecule that is specifically hybridizable with a 5'-untranslated region (5'UTR) of a nucleic acid molecule encoding CD40.

33. The antisense compound of claim 1, wherein said antisense compound comprises an antisense nucleic acid molecule that is specifically hybridizable with a start region of a nucleic acid molecule encoding CD40.

34. The antisense compound of claim 1, wherein said antisense compound comprises an antisense nucleic acid molecule that is specifically hybridizable with a coding region of a nucleic acid molecule encoding CD40.

35. The antisense compound of claim 1, wherein said antisense compound comprises an antisense nucleic acid molecule that is specifically hybridizable with a stop region of a nucleic acid molecule encoding CD40.

36. The antisense compound of claim 1, wherein said antisense compound comprises an antisense nucleic acid molecule that is specifically hybridizable with a 3'-untranslated region of a nucleic acid molecule encoding CD40.

37. The antisense compound of claim 1 which does not elicit RNase H cleavage of its RNA target in an antisense compound-target RNA duplex.

38. The antisense compound of claim 14 wherein every sugar moiety is a 2'-O-methoxyethyl sugar moiety.

39. The antisense compound of claim 1 which is a peptide-nucleic acid antisense compound.

40. The antisense compound of claim 39 wherein the peptide-nucleic acid antisense compound has at least one cationic moiety conjugated thereto.

41. The antisense compound of claim 40 wherein at least one cationic moiety is conjugated to the C-terminal end of the peptide-nucleic acid antisense compound.

42. The antisense compound of claim 40 wherein at least one cationic moiety is conjugated to the N-terminal end of the peptide-nucleic acid antisense compound.

43. The antisense compound of claim 40 wherein at least one cationic moiety is conjugated to the N-terminal end and at least one cationic moiety is conjugated to the C-terminal end of the peptide-nucleic acid antisense compound.

44. The antisense compound of claim 40 wherein the cationic moiety comprises a cationic amino acid.

45. The antisense compound of claim 44 wherein the cationic amino acid is L-lysine, D-lysine, L-dimethyllysine, D-dimethyllysine, L-histidine, D-histidine, L-ornithine, D-ornithine, L-arginine, L-homoarginine, D-homoarginine, L-norarginine, D-norarginine, L-homohomoarginine, D-homohomoarginine, lysine peptoid, 2,4-diamino butyric acid, homolysine or β -lysine.

46. The antisense compound of claim 45 wherein the cationic amino acid is L-lysine or L-arginine.

47. The antisense compound of claim 40 wherein the peptide-nucleic acid antisense compound has at least two cationic moieties conjugated thereto.

48. The antisense compound of claim 47 wherein the peptide-nucleic acid antisense compound has at least three cationic moieties conjugated thereto.

49. The antisense compound of claim 48 wherein the peptide-nucleic acid antisense compound has at least four cationic moieties conjugated thereto.

50. The antisense compound of claim 49 wherein the peptide-nucleic acid antisense compound has at least five cationic moieties conjugated thereto.

51. The antisense compound of claim 50 wherein the peptide-nucleic acid antisense compound has at least six cationic moieties conjugated thereto.

52. The antisense compound of claim 51 wherein the peptide-nucleic acid antisense compound has at least seven cationic moieties conjugated thereto.

53. The antisense compound of claim 52 wherein the peptide-nucleic acid antisense compound has at least eight cationic moieties conjugated thereto.

54. The antisense compound of claim 39 wherein the peptide-nucleic acid antisense compound is at least 12 nucleobases in length.

55. The antisense compound of claim 54 wherein the peptide-nucleic acid antisense compound is at least 14 nucleobases in length

56. The antisense compound of claim 1 wherein said CD40 is human or mouse CD40.

57. An antisense compound of claim 37 which causes redirection of splicing of CD40 RNA.

58. The antisense compound of claim 57 wherein the ratio of CD40 Type 2 transcript is increased relative to the CD40 Type 1 transcript.

59. the antisense compound of claim 58 wherein the expression of cell surface-associated CD40 is reduced.

60. The antisense compound of claim 1 which reduces CD40 signaling.

61. The antisense compound of claim 60 which reduces CD40-dependent IL-12 cytokine production.

62. A method of redirecting splicing of CD40 RNA in a cell or tissue comprising contacting said cell or tissue with an antisense compound of claim 57, so that the ratio of CD40 splice products is altered.

63. The method of claim 62 wherein the ratio of CD40 Type 2 transcript is increased relative to the CD40 Type 1 transcript.

64. The method of claim 63 wherein CD40 signaling is reduced.

65. The method of claim 64 wherein IL-12 cytokine production is reduced.

66. A method of reducing CD40 signaling in a cell or tissue comprising contacting said cell or tissue with an antisense compound of claim 57, so that the ratio of CD40 splice products is altered and CD40 signaling is reduced.

67. A method of reducing IL-12 cytokine production in a cell or tissue comprising contacting said cell or tissue with an antisense compound of claim 57, so that the ratio of CD40 splice products is altered and IL-12 cytokine production is reduced.

68. An immunomodulatory agent comprising an antisense compound of claim 1.

69. An immunomodulatory agent comprising an antisense compound of claim 57.